



VISUALIZATION OF THE STRUCTURE OF A PULSED METHANE-AIR DIFFUSION FLAME

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These images represent high-speed photography of a pulsed methane diffusion flame superimposed on the flame's Schlieren effect. The flame is imbedded in an outer coflowing air stream. The flame's jet exit speed, outer flow speed, and forcing frequency are varied. The Schlieren image, marked

by pointer A, shows the edge of the hot gas envelope surrounding the flame. The bright, yellow-orange, soot-laden core flow is marked by pointer B. See Ref. 9. In the unforced flow and over most of the frequency range in the forced case, a double structure is observed with two distinct wavelengths: a long wavelength associated with the luminous, buoyancy-driven core flow and a short wavelength associated with the shear-driven outer flow. Excitation at the proper frequency (10 Hz) causes strong coupling to occur. In this case the core flow pinches off and the flame breaks up into a series of flamelets moving with a single wavelength.